Application of *N*-Period Dynamic Inventory Model with Deterministic and Probabilistic Demand

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Abstract

The private sector, driven by a global competitive environment, faces the challenge of improving services, while lowering costs. Many companies have adopted innovative business practices, to meet customer needs and retain profitability. That is why the enterprise restructuring is becoming very important. In this article we briefly present a methodology for systematic and efficient approach concerning the enterprise restructuring, called COMPASS, which offers aid in the key decision making points. At the initial development phase of COMPASS the generation of the success factors is done heuristcally, but it is continually upgraded in order to improve its usability. It is an open methodology that allows implementation of various additional methods/tools that are scientifically funded, but yet understandable and easy to use. This methods are going to help the generation of more reliable success factors.
One of the objectives is to concentrate on the development of the inventory problem itself, because of its practical and economic importance. Inventories are expensive and very important asset to many companies. The subject of inventory control and planning is considered in many situations. The fundamental decisions in inventory controlling concerning the inventory policy are amenable to quantitative analysis associated with the inventory theory as collection of management science methods. The problem of making the optimal decisions regarding the inventory policy can not be solved as a unique inventory model. There are many relevant factors in an inventory model design, hence the development of a number of inventory models. The type of demand is a principle factor. In that direction, description and comparision of different existing mathematical inventory models are carried out. Also they will be illustrated and compared on practical examples. Besides the introduction of the small segment of the inventory theory, the introduction of other operations research methods such as dynamic programming and Markov decision processes in this models is inevitable. The reason is that a numerical solution of these models requires the use of the dynamic programming technique, and the probabilistic model is a stochastic decission process where the transition probabilities between the states are described by a Markov chain. The finite number of periods is not a serious limitation, since it is not practical to assume that the item will be held in stock indefinitely. The objective is to find the optimal inventory policy and to determine the utility function (value function). This utility function helps to determine minimum total expected cost. One of the advantages of this theory is that besides the mathematical background, one can use these models in real life inventory policy determination, since the calculations for the optimal policy determination and the utility function value can be obtained easily using computer programs.